SITE INSPECTION REPORT
NIAGARA FALLS BOULEVARD
9524 AND 9540 NIAGARA FALLS BOULEVARD
NIAGARA FALLS, NEW YORK

CERCLIS ID No.: NYN000206699

EPA Contract No.: EP-S5-06-04
TDD No.: S05-0013-1307-008
Document Control No.: 2223-2A-BKYP

June 2014

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY

Prepared by:

Weston Solutions, Inc.
Edison, New Jersey 08837

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June 2014

SUBMITTED BY:

Denise Breen ______________________ Date 6/9/2014

Denise Breen
Assistant Project Scientist

Gerald V. Gilliland ______________________ Date 6/9/2014

Gerald V. Gilliland, P.G.
Senior Technical Manager

SITE SUMMARY

The 9540 Niagara Falls Boulevard site (CERCLIS ID NYN000206699), hereinafter referred to as "NFB" or "the site", is located in a mixed commercial and residential area of Niagara Falls, New York [Ref. 2 , Figures 1 and 2; 3 , pp. 1–3]. The site consists of two parcels, namely 9524 and 9540 Niagara Falls Boulevard, and encompasses approximately 2.53 acres [Ref. 4, pp. 1– 2; 5, p. 1]. Currently, the 9524 Niagara Falls Boulevard property contains a bowling alley and an asphalt parking lot; the 9540 Niagara Falls Boulevard property contains a vacant building and an asphalt parking lot [Ref. 2, Figure 2]. The properties are bordered to the north by a wooded area; to the east by a church; to the south by Niagara Falls Boulevard, beyond which is a residential area; and to the west by a hotel and residential area [Ref. 2, Figure 2]. The Site Location Map and Site Map are included in the report as Figures 1 and 2, respectively.

In 1978, the U.S. Department of Energy (DOE) conducted an aerial radiological survey of the Niagara Falls region and found more than 15 properties having elevated levels of radiation above background levels [Ref. 11, pp. 1-2]. It is believed that, in the early 1960s, slag from the Union Carbide facility located on 47th Street in Niagara Falls was used as fill on the properties prior to paving [Ref. 6, pp. 1-2]. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium [Ref. 6, pp. 1-2]. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material [Ref. 6, p. 1; 11, pp. 1– 2; 12, p. 1; 13, pp. 1– 3; 14, p. 3; 15, pp. 1– 2]. Union Carbide subsequently obtained a license from the Atomic Energy Commission, now the Nuclear Regulatory Commission (NRC), and the State of New York; however, the slag had been used as fill throughout the Niagara Falls region prior to licensing [Ref. 6, pp. 1-2]. Based on the original survey and subsequent investigations, it is believed that the radioactive Union Carbide slag was deposited on the Niagara Falls Boulevard site [Ref. 6 , p. 1; 11, pp. 1–2; 12, p. 1; 13, pp. 1–3; 14, p. 3; 15, pp. 1–2].

In September/October 2006 and May 2007, NYSDEC conducted radiological surveys of the interior and exterior of both properties on several occasions using both an Exploranium-135 and Ludlum 2221 detectors [Ref. 13, pp. 1– 4; 14, pp. 1– 5; 15, pp. 1– 2]. With the exception of an office area and storage space at 9540 Niagara Falls Boulevard that was constructed after the original building directly on top of the asphalt parking lot, interior radiation levels were relatively low [Ref. 13, pp. 1-4]. The highest reading in the newer area was 115 microroentgens per hour (μR/hr); elsewhere throughout the building, radiation levels generally ranged between 10 and 20 μR/hr [Ref. 13, pp. 1-4]. Exterior readings taken at waist height generally ranged between 10 and 350 μR/hr, while the maximum reading of 600 μR/hr was recorded on contact (i.e., at the ground surface) [Ref. 14, pp. 3-4]. At a fenced area behind the building located at 9540 Niagara Falls Boulevard, waist-high readings ranged between 200 and 450 μR/hr, and on-contact readings ranged between 450 and 750 μR/hr [Ref. 14, pp. 3-4]. Elevated readings were also observed on the swath of grass between the 9524 Niagara Falls Boulevard property and the adjacent property to the west that contains a hotel, and in the marshy area beyond the parking lot behind the buildings [Ref. 14, pp. 3-4]. Two biased samples of slag were collected from locations that exhibited elevated static Ludlum detector readings: one sample was collected from an area of loose blacktop that indicated readings of 515,905 counts per minute (cpm) on the Ludlum detector, and one slag sample was collected in the marshy area that indicated readings of 728,235 cpm on the Ludlum detector [Ref. 13, pp. 1–4; 14, pp. 1–5; 15, pp. 1–2].

During a reconnaissance performed by the New York State Department of Health (NYSDOH) and New York State Department of Environmental Conservation (NYSDEC) on July 9, 2013, screening activities showed radiation levels at 200 μR/hr with a hand-held pressurized ion chamber (PIC) unit around an area of broken asphalt and 500 μR/hr from a soil pile containing slag [Ref. 35, pp. 1– 3]. Readings over 600,000 cpm were recorded with a sodium iodide (NaI) 2x2 scintillation detector from the soil and slag pile [Ref. 35, p. 3].

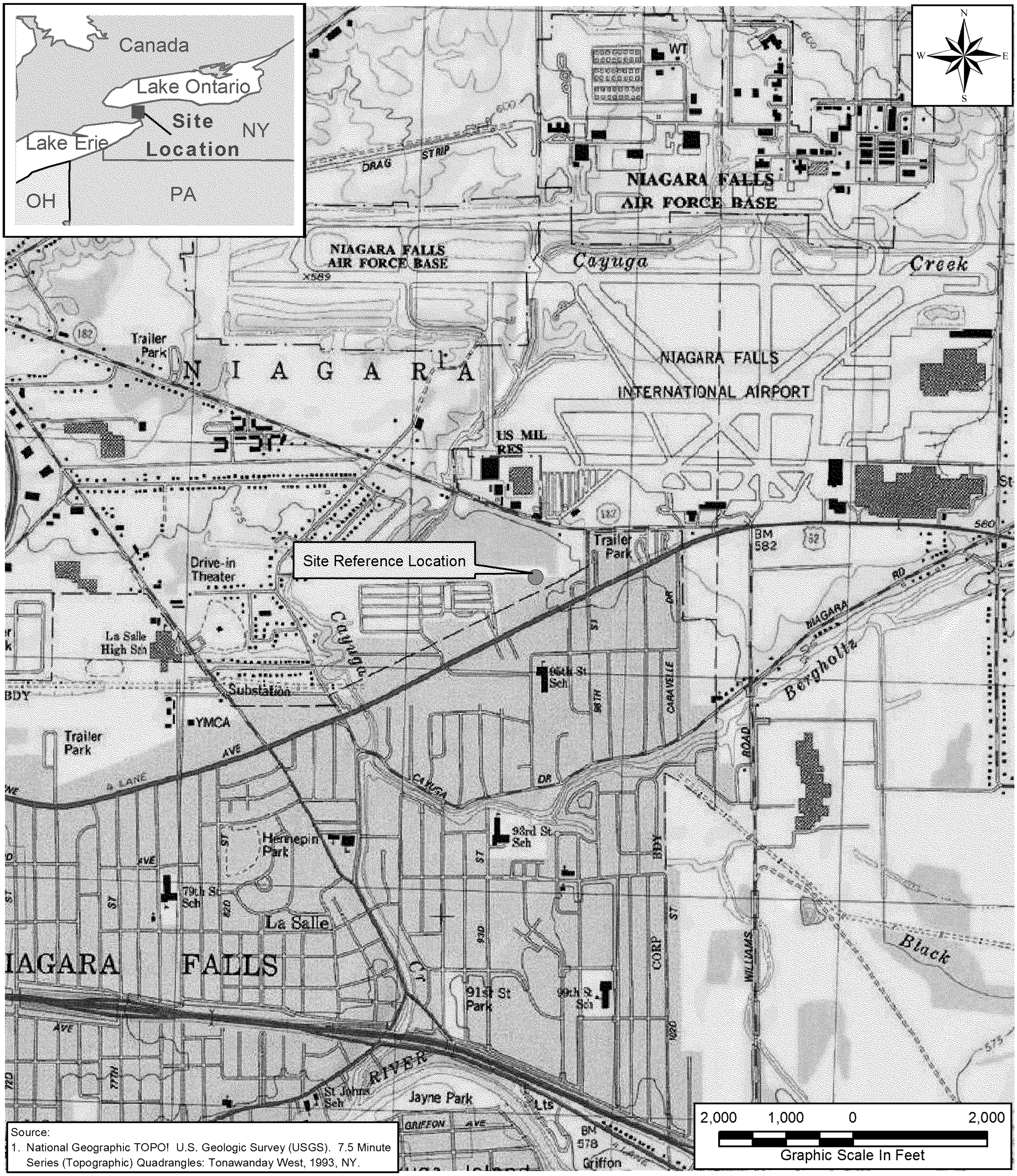
On September 10, 2013, Weston Solutions, Inc. (WESTON®) conducted a gamma radiation screening of the 9524 Niagara Falls Boulevard property using a Ludlum 2221 Scaler Ratemeter [Ref. 7, pp. 3– 5, 17]. On December 4– 5, 2013, further radiological survey information was obtained from the 9524 and 9540 Niagara Falls Boulevard properties, as well as the church property located further east of the two site parcels [Ref. 7, pp. 6– 8]. The highest gamma radiation screening results were recorded from the exposed soil area of the rear, northern portion of the 9540 Niagara Falls Boulevard property [Ref. 7 p. 12]. A Gamma Radiation Screening Results Map, which depicts the levels of gamma radiation detected at 1 meter above ground surface during the December survey, is included as Figure 3 in this report.

On December 5– 7, 2013, WESTON documented the areas of observed contamination at the Niagara Falls Boulevard site [Ref. 7, pp. 5-12; 38, p. 1. The areas of observed contamination were delineated by measuring the gamma radiation exposure rates, and determining where the gamma radiation exposure rate around the source equals or exceeds two times the gamma radiation at site-specific background rates [Ref. 38, p. 1]. The areas of observed contamination are defined by site-attributable gamma radiation exposure rates, as measured by a survey instrument held 1 meter above the ground surface, which equal or exceed two times the site-specific background gamma radiation exposure rate [Ref. 1, pp. 8-9; 38, p. 1]. At the NFB site, an area of approximately 168,832 square feet (ft^2) was found to have gamma radiation levels which exceed two times (2x) the background measurement of 8,391 cpm [Ref. 38, p. 1]. PIC data were also collected at several points to confirm the boundary [Ref. 38, pp. 1-3]. The source boundaries can be seen on Figure 4, included in this report.

On December 11, 2013, WESTON collected a total of 16 soil samples (including one environmental duplicate sample) and three slag samples from fifteen boreholes advanced throughout the Niagara Falls Boulevard site and the First Assembly Church property located directly adjacent to the east/northeast of the site property, using hollow-stem auger drilling methods [Ref. 7, pp. 13– 16, 20–23; 8, pp. 3– 4]. The two soil samples collected on the First Assembly Church property are to document background conditions [Ref. 8, p. 3]. At each sample location, soil samples were collected directly beneath slag; at locations where slag was not present, the soil sample was collected at the equivalent depth interval [Ref. 7, pp. 13– 16; 8, pp. 3–4]. A Sample Location and Data Results Map is included as Figure 4 in this report.

The soil samples were analyzed by TestAmerica Laboratories for Target Analyte List (TAL) metals analyses; isotopic thorium, isotopic uranium, radium-226, and radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy [Ref. 8, p. 2]. The slag samples were analyzed for isotopic thorium, isotopic uranium, radium-226, and radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy [Ref. 8, p. 2]. Analytical results indicate concentrations of radionuclides found in the slag and soil to be significantly higher than at background conditions (i.e., greater than 2x background concentrations) [Ref. 32, pp. 1– 5; 36, pp. 10–33].

On April 28, 2014, WESTON personnel collected radon and thoron concentration measurements from locations on and in the vicinity of the NFB site [Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. At the selected locations in background areas, above the source material, and off the source area, radon and thoron concentration measurements in picocuries per liter (pCi/L) were collected with RAD7 radon d etectors [Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-4, 9, 11]. The radon and thoron measurements were collected at heights of one meter above the ground surface [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. During the April 2014 air monitoring event, background radon concentrations were measured as 0.00 +/- 0.16 pCi/L (to account for maximum background concentrations, the uncertainty value is added to the background measurement for an adjusted concentration of 0.16 pCi/L) during the morning hours and 0.00 +/- 0.16 pCi/L (adjusted concentration is 0.16 pCi/L) during the afternoon hours [Ref. 2, Figure 9; 7, pp. 17-20; 44, pp. 4 -5, 9, 11]. Background thoron concentrations were calculated to be 0.039 +/- 0.08 pCi/L (adjusted concentration is 0.12 pCi/L) during the morning hours and 0.00 +/- 0.04 pCi/L (adjusted concentration is 0.04 pCi/L) during the afternoon hours [Ref. 2, Figure 9; 7, pp. 17-20; 44, pp. 5, 9, 11]. To account for minimum possible release concentrations, the uncertainty value for each potential release measurement collected above and downwind of source areas is subtracted from the measurement to calculate the adjusted concentration [Ref. 44, pp. 4 -5, 9, 11]. There were no radon or thoron concentrations that exceeded the site-specific background, nor were there any adjusted concentrations that equaled or exceeded a value two standard deviations above the mean site-specific background concentration for that radionuclide in that type of sample [Ref. 2, Figure 9; 44, pp. 5, 9, 11].



LEGEND:

Site Reference Location

TITLE:

Site Location Map
Niagara Falls Boulevard
Niagara Falls, NY

PROJECT:
Niagara Falls Boulevard

CLIENT NAME:
EPA

DATE:
June 2014

FIGURE #:
1

P:\SAT2\2013NY RAD Sites\Niagara_Falls_Boulevard\MXD\14064_NFB_TR_Topo.mxd

P:/SAT2/2013 NY RAD Sites/Niagara_Falls_Boulevard/MXD/14338_NFB_SI_Aerial.mxd

SOURES:
1. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Niagara County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.
2. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Erie County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.

Scale: 50 25 0 50
Graphic Scale In Feet

TITLE:
Site Map
Niagara Falls Boulevard
Niagara Falls, NY

DRAWN BY: J. Lynes
REVIEWED BY: M. Capriglione
PROJECT MANAGER: M. Capriglione
SCALE: 1" = 50'
DATE: June 2014

N
W E
S

PROJECT: Niagara Falls Boulevard

CLIENT NAME: EPA

DRAWING NUMBER: 14338

FIGURE #: 2

Scale:

100 50 0 100

Graphic Scale In Feet

TITLE:

Gamma Radiation Screening Results Map
12/04/2013 and 12/05/2013
Niagara Falls Boulevard
Niagara Falls, NY

DRAWN BY: J. Lynes

REVIEWED BY: M. Capriglione

PROJECT MANAGER: M. Capriglione

SCALE: 1" = 100'

DATE: June 2014

PROJECT: Niagara Falls Boulevard

CLIENT NAME: EPA

WESTON SOLUTIONS

DRAWING NUMBER: 13934

FIGURE #: 3

N S W E

P:/SAT2/2013 NY RAD Sites/Niagara_Falls_Boulevard/MXD/14448_NFB_SI_Sample_Loc_w_Results.mxd

NOTES:
1. All sample IDs preceded by "2223-".
2. All results are in picocuries per gram (pCi/g).
3. Sample results highlighted in red indicate a detection greater than: 2 standard deviations above mean site specific background (2223-S14 and 2223-S15) and regional background (0.5-1.5 pCi/g).
4. All depths are in feet below ground surface (ftbgs).
5. U - Not detected above reporting limit

SOURES:
1. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Niagara County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.
2. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Erie County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.
3. WESTON Region 5 Superfund Technical Assessment and Response Team (START). Site Logbook No. 2223-4E-BJCC, 9540 Niagara Falls Boulevard; with attached photo documentation. September to December 2013.

Scale: 100 50 0 100
Graphic Scale In Feet

TITLE:
Sample Location and Data Results Map
Niagara Falls Boulevard
Niagara Falls, NY

DRAWN BY: J. Lynes
REVIEWED BY: M. Capriglione
PROJECT MANAGER: M. Capriglione
SCALE: 1" = 100'

N W E S

PROJECT: Niagara Falls Boulevard
CLIENT NAME: EPA
WESTON SOLUTIONS
DRAWING NUMBER: 14448
FIGURE #: 4
DATE: June 2014

SITE ASSESSMENT REPORT: PRELIMINARY ASSESSMENT/SITE INSPECTION

PART I: SITE INFORMATION

1. Site Name/Alias Niagara Falls Boulevard

Street 9524 and 9540 Niagara Falls Boulevard

City Niagara Falls State New York Zip 14304

2. County Niagara County Code 063 Cong. Dist. 26

3. CERCLIS ID NO. NYN000206699

4. Parcel Nos. 146.19 -3-1 and 146.19-3-2

5. Latitude 43.0964 North Longitude: -78.952686 West
(Using the building at 9524 Niagara Falls Boulevard as the reference point)

USGS Quad(s) Tonawanda West, NY

6. Approximate size of site 3.53 acres

7. Current Owner Leonard Pimm Telephone No. 716-998-6113

Mailing Address 9524 Niagara Falls Boulevard

City Niagara Falls State New York Zip 14304

8. Current Operator Leonard Pimm Telephone No. 716-998-6113

Mailing Address 9524 Niagara Falls Boulevard

City Niagara Falls State New York Zip 14304

9. Type of Ownership

_X_ Private Federal___ ___ State

___ County ___ Municipal ___ Unknown ___ Other ________

Ref. 2, Figures 1 and 2; 3, pp. 1-3; 4, pp. 1–2; 9, p. 1; 41, pp. 1–2; 42, p. 1.

10. Owner/Operator Notification on File

___ RCRA 3010 ___ Date ___ CERCLA 103c Date _______

_X__ None __ Unknown

11. Permit Information

Permit Permit No. Date Issued Expiration Date Comments _________

There were no RCRA permits or other permit information found for the subject property. The 9540 property was identified in an environmental records database search as a result of contaminated soil found during the removal of four underground storage tanks (USTs) located on the property that contained gasoline, heating oil, and waste oil in January 2001. In February 2013 the 9524 property was identified in an environmental records database search as a result of illegal dumping of methamphetamine supplies/chemicals that was found by the property owner in the woods behind the bowling alley. The materials were reported to the local police department; contractors for the NYSDEC removed the materials from the property.

Ref. 10, pp. 19–23.

12. Site Status

_X_ Active _X_ Inactive __ Unknown

The bowling alley at 9524 Niagara Falls Boulevard is active; the 9540 property is inactive and vacant [Ref. 7, p. 5; 34, p. 1].

13. Years of Operation: It is believed that, in the early 1960s, slag from the Union Carbide facility located on 47 th Street in Niagara Falls was used as fill on the properties prior to paving. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material.

Ref. 5, pp. 1–3; 6, p. 1.

14. Identify the types of waste sources (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Sources

Waste Unit No.	Waste Source Type	Facility Name for Unit
1	Contaminated Soil	N/A

b) Other Areas of Concern

Radioactive slag likely deposited at the site by Union Carbide is present at the site. During the 2013 PA/SI field investigation, slag was observed in in all soil borings collected from the Site. The slag ranged in thickness from 0.5 feet to 2 feet; at each location, the slag was mixed with soil.

Ref. 6, p. 1; 11, pp. 1–2; 12, p. 1; 13, pp. 1–3; 14, p. 3; 15, pp. 1–2; 37, pp. 1–15.

15. Describe the regulatory history of the site, including the scope and objectives of any previous response actions, investigations and litigation by State, Local and Federal agencies (indicate type, affiliation, date of investigations).

- **U.S. DOE Aerial Radiological Survey, 1978** – In 1978, the U.S. D OE conducted an aerial radiological survey of the Niagara Falls region, and found more than 15 properties having elevated levels of radiation above background levels. It is believed that in the early 1960s, slag from the Union Carbide facility located on 47th Street in Niagara Falls was used as fill on the properties prior to paving. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material. Union Carbide subsequently obtained a license from the Atomic Energy Commission, now the NRC, and the State of New York; however, the slag had been used as fill throughout the Niagara Falls region prior to licensing. Based on the original survey and subsequent investigations, it is believed that the radioactive Union Carbide slag was deposited on the 9540 Niagara Fall Boulevard site.

  Ref. 5 p. 1; 6, p. 1.

- **NYSDEC and NYDOH, April –May 1979** – In April and May 1979, NYSDEC and the NYSDOH conducted a radiological survey of the interior of the buildings and in the parking lots; they also collected samples of the slag. The highest radiation level detected in the interior of the buildings was 100 μR/hr. Radiation levels in the parking lots ranged between 200 and 500 μR/hr. Analytical results of the slag samples showed approximate uranium-238 concentrations of 1,010 picocuries per gram (pCi/g), approximate thorium-232 concentrations of 840 pCi/g, and approximate radium-226 concentrations of 205 pCi/g. A risk analysis and evaluation of alternative actions were conducted based on the findings. NYSDOH concluded that the continuing use of both properties did not pose a hazard to either the general public or on-site workers. NYSDOH instructed the property owners to maintain the surface of the parking lot and notify the NYSDOH if the property is sold or the parking lot is disturbed.

Ref. 5, pp. 1–2; 11, pp. 2, 5, 12–15, 17–21; 12, pp. 1–2.

- **NYSDOH Radiological Survey, September/October 2006 and May 2007** – In September/October 2006 and May 2007, NYSDEC conducted radiological surveys of the interior and exterior of both properties on several occasions using both an Exploranium-135 and Ludlum 2221 detectors. With the exception of an office area and storage space at 9540 Niagara Falls Boulevard that was constructed after the original building directly on top of the asphalt parking lot, interior radiation levels were relatively low. The highest reading in the newer area was 115 μR/hr; elsewhere throughout the building, radiation levels generally ranged between 10 and 20 μR/hr. Exterior readings taken at waist height generally ranged between 10 and 350 μR/hr, while the maximum reading of 600 μR/hr was recorded on contact (i.e., at the ground surface). At a fenced area behind the building located at 9540 Niagara Falls Boulevard, waist-high readings ranged between 200 and 450 μR/hr, and on-contact readings ranged between 450 and 750 μR/hr. Elevated readings were also observed on the swath of grass between the 9524 Niagara Falls Boulevard property and the adjacent property to the west that contains a hotel, and in the marshy area beyond the parking lot behind the buildings. Two biased samples of slag were collected from locations that exhibited elevated static Ludlum readings: one sample was collected from an area of loose blacktop that indicated readings of 515,905 cpm on the Ludlum, and one slag sample was collected in the marshy area that indicated readings of 728,235 cpm on the Ludlum detector.

  Ref. 13, pp. 1–4; 14, pp. 1–5; 15, pp. 1–2]

- **NYSDEC Radiological Survey, July 2013** – In July 2013, NYSDEC conducted a radiological survey of the exterior of both properties using a NaI 2x2 gamma radiation meter and a Victoreen pressurized ion chamber (PIC) radiation meter. An area of broken asphalt showed radiation levels up to 200 μR/hr. An overgrown fenced area containing a soil pile with visible slag behind 9540 Niagara Falls Boulevard showed levels up to 500 μR/hr on the PIC radiation meter and over 600,000 cpm on the gamma radiation meter. NYSDEC observed empty beer cans and old tires positioned as seats in this portion of the site, indicating that areas of contamination are readily accessible to the public.

  Ref. 35, pp. 1–3

- **On-site Reconnaissance, September 2013** – An on-site reconnaissance was conducted by WESTON personnel on September 10, 2013 to perform a gamma radiation screening [Ref. 7, pp. 2–5, 17]. Radiation levels detected while surveying the parking lot on the east side of the building adjacent to 9540 Niagara Falls Boulevard were consistently between 150,000 and 175,000 cpm, and the levels detected at the parking lot behind (i.e., north) of the building were consistently between 180,000 and 190,000 cpm. WESTON surveyed an area of broken asphalt in the rear parking lot; radiation levels ranged from 200,000 to 300,000 cpm. WESTON also surveyed gamma radiation levels inside the building. Once inside the building, levels ranged between 6,000 and 10,000 cpm. The property owner stated that the whole back area (e.g., the lockers, arcade area, and small bowling store) was raised 2 feet with concrete, and that the radiation levels inside the building in this area were greatly reduced as a result. Weston personnel also observed current site conditions and collected Global Positioning System (GPS) points [Ref. 7, pp. 3–5].

- **Gamma Radiation Screening and Determination of the Area of Observed Contamination, December 2013** – On December 5–7, 2013, WESTON documented the areas of observed contamination at the NFB site [Ref. 7, pp. 7–12; 38, p. 1]. The areas of observed contamination were delineated by measuring the gamma radiation exposure rates and determining that the gamma radiation exposure rate around the source equals or exceeds two times the gamma radiation rate at site-specific background [Ref. 7, pp. 7–12; 38, p. 1]. The areas of observed contamination are defined by site-attributable gamma radiation exposure rates, as measured by a survey instrument held one meter above the ground surface, which equal or exceed two times the site-specific background gamma radiation exposure rate [Ref. 1, pp. 8–9]. At the NFB site, an area of approximately 168,832 ft^2 was found to have gamma radiation levels which exceed two times the background measurement of 8,391 cpm [Ref. 38, p. 1]. The area of contamination is presented as the Source Boundary on Figure 4 [Ref 2, Figure 4].

- **Site Inspection Soil Sampling, December 2013** – On December 11, 2013, WESTON personnel collected a total of 16 soil samples (including one environmental duplicate sample) and three slag samples from fifteen boreholes advanced through the NFB site and First Assembly Church located directly adjacent to the east northeast of the site property, using hollow-stem auger drilling methods in order to determine if the surrounding soil has been impacted by gamma radiation. Soil samples were also collected to document background conditions from two locations outside of the influence of possible slag presence [Ref. 7, pp. 13–16; 8, pp. 2–4, 6–7, 12–15]. Sample locations are depicted on Figure 4 [Ref. 2, Figure 4]. Analytical results indicate concentrations of radionuclides found in the slag and soil to be significantly higher than (e.g., greater than 2x) background conditions [Ref. 32, pp. 1–5; 36, pp. 10-33].

- **Site Inspection Air Monitoring, April 2014** – On April 28, 2014, WESTON personnel collected radon and thoron concentration measurements from locations on and in the vicinity of the NFB site [Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. At the selected locations in background areas, above the source material, and off the source area, radon and thoron concentration measurements in pCi/L were collected with RAD7 radon detectors [Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-4, 9, 11] . The radon and thoron measurements were collected at heights of one meter above the ground surface [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. During the April 2014 air monitoring event, background radon concentrations were measured as 0.00 +/- 0.16 pCi/L (to account for maximum background concentrations, the uncertainty value is added to the background measurement for an adjusted concentration of 0.16 pCi/L) during the morning hours. and 0.00 +/- 0.16 pCi/L (adjusted concentration is 0.16 pCi/L) during the afternoon hours [Ref. 44, pp. 4 -5, 9, 11]. Background thoron concentrations were calculated to be 0.039 +/- 0.08 pCi/L (adjusted concentrations is 0.12 pCi/L) during the morning hours and 0.00 +/- 0.04 pCi/L (adjusted concentration is 0.04 pCi/L) during the afternoon hours [Ref. 44, pp. 5, 9, 11]. To account for minimum possible release concentrations, the uncertainty value for each potential release measurement collected above and downwind of source areas is subtracted from the measurement to calculate the adjusted concentration [Ref. 44, pp. 4-5, 9, 11], There were no radon or thoron concentrations that exceeded the site-specific background, nor were there any adjusted concentrations that equaled or exceeded a value two standard deviations above the mean site-specific background concentration for that radionuclide in that type of sample [Ref. 44, pp. 5, 9, 11].

a) Is the site or any waste source subject to Petroleum Exclusion? Identify petroleum products and by products that justify this decision.

The 9540 property was identified in an environmental records database search as a result of contaminated soil found during the removal of four USTs that contained gasoline, heating oil, and waste oil.

Ref. 10, pp. 19–21.

b) Has normal farming application of pesticides registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) occurred at the site? Have pesticides been produced or stored at the site? Have there been any leaks or spills of pesticides on site?

Historical topographic and aerial photos indicate that the Site may have been historically used for agricultural purposes. However, since the late 1940s to early 1950s the Site has been developed as a commercial area of Niagara Falls, NY. Pesticide analyses were not conducted for soil samples collected from the site by WESTON in December 2013.

Ref. 17, pp. 3–8; 18, pp. 4–13; 19, pp. 4–7.

c) Is the site or any waste source subject to Resource Conservation and Recovery Act (RCRA) Subtitle C (briefly explain)?

The current owner of the Site, Leonard Pimm, does not hold any Resource Conservation and Recovery Act permits. Historic facility documents of both Rapid Bowling Lanes and Dunn Tire reviewed did not reveal any permits.

Ref. 10, pp. 15–18.

d) Is the site or any waste source maintained under the authority of the Nuclear Regulatory Commission (NRC)?

The Site or subject property is not included in Material Licensing Tracking System (MLTS) database. The MLTS is maintained by the NRC and contains a list of sites that possess or use radioactive materials. However, it is believed that in the early 1960s, slag from the Union Carbide facility located on 47 th Street in Niagara Falls was used as fill on the Site prior to paving. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material. Union Carbide subsequently obtained a license from the Atomic Energy Commission, now the NRC, and the State of New York; however, the slag had been used as fill throughout the Niagara Falls region prior to licensing.

Ref. 6, p. 1; 10, pp. 6, 17.

16. Do any conditions exist on site which would warrant immediate or emergency action?

No conditions were noted that would warrant immediate or emergency action.

Ref. 7, pp. 3-5.

17. Information available from:

Contact: Andrew Fessler Agency: EPA Region II Telephone No.: 212-637-4333
Preparer: Denise Breen Agency: Region V START III Date: June 2014

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following items.

Waste Unit 1 - Contaminated Soil

Source Type

____	Landfill	X	Contaminated Soil
____	Surface Impoundment	____	Pile
____	Drums	____	Land Treatment
____	Tanks/Containers	____	Other

Description:

1. Describe the types of containers, impoundments, or other storage systems (i.e., concrete - lined surface impoundments) and any labels that may be present.

   In December 2013, as part of the SI, WESTON documented the areas of observed contamination at the NFB site. The areas of observed contamination were delineated by measuring the gamma radiation exposure rates and determining that the gamma radiation exposure rate around the source equals or exceeds two times the gamma radiation rate at site-specific background. In addition, WESTON personnel collected a total of 16 soil samples and three slag samples from fifteen boreholes advanced in and around the NFB site, using hollow-stem auger drilling methods in order to determine if the surrounding soil has been impacted by gamma radiation. Soil samples were also collected to document background conditions. Analytical results indicate concentrations of radionuclides found in the slag and soil to be significantly higher than (i.e., greater than 2x) background conditions.

   Ref. 7, pp. 7–16, 17-20, 31-32; 8, pp. 2–4, 6–7, 12–15; 32, pp. 1–5; 33, pp. 17–34, 37–39; 36, pp. 10–33; 38, p. 1.

2. Describe the physical condition of the containers or storage systems (i.e., rusted and/or bulging drums).

   The waste source at the site is contaminated soil and slag; it is not containerized.

   Ref. 6, p. 1; 7, pp. 3–5, 8, 10–12; 8, p. 4; 33, pp. 17–34, 37–39.

3. Describe any secondary containment that may be present (e.g., drums on concrete pad in building or aboveground tank surrounded by berm).

   The waste source at the site is contaminated soil and slag on the ground surface. There is no secondary containment associated with the waste source.

   Ref. 6, p. 1; 7, pp. 3–5, 8, 10–12; 8, p. 4; 33, pp. 17–34, 37-39.

Hazardous Waste Quantity

In order to establish the area of observed contamination, WESTON performed a complete gamma screening of the site. Significant readings (i.e., greater than 2x the site-specific background of 16,782 cpm) of gamma screening results were used to establish an area of observed contamination of approximately 3.86 acres, or 168,832 ft^2. The approximate depth of the slag material is from ground surface to 2.5 feet below ground surface (bgs) with a thickness of the slag material being approximately 0.5– 2 feet. The volume of on-site contaminated soil is unknown; therefore, the area measurement is used as the hazardous waste quantity for the purpose of this report.

Ref. 1, pp. 8–12; 2, Figures 3 and 4; 32, pp. 1–5; 37, pp. 1–15; 38, p. 1.

Hazardous Substances/Physical State

The hazardous presence of gamma radiation that is 2x the site-specific background (i.e., greater than 16,782 cpm) was used to define the area of observed contamination of gamma exposure rates. To establish observed contamination for a site-attributable radionuclide in soil, the measured concentration: 1) equals or exceeds a value two standard deviations above the mean site-specific background concentration for that radionuclide, or 2) exceeds the upper-limit value of the range of regional background concentration. Employing these criteria, as well as evaluating the overall radiochemistry of the samples, the following contaminants are present at significant concentrations in the source: uranium-238, thorium-230, uranium-233/234, radium-226, thorium-232, radium-228, and thorium-228. The physical state of on-site contaminated soil and slag is solid.

Ref. 1, pp. 8–9; 2, Figure 4; 4, pp. 7–18; 32, pp. 1–5; 37, pp. 1–15; 38, p. 1.

PART III. SAMPLING RESULTS

Determination of the Area of Observed Contamination

In accordance with Hazard Ranking System (HRS) requirements for naturally-occurring radionuclides, areas of observed contamination are defined by site-attributable gamma radiation exposure rates, as measured by a survey instrument held 1 meter above the ground surface, which equal or exceed two times the site-specific background gamma radiation exposure rate obtained with the same type of instrument [Ref. 1, pp. 8–9]. On December 5–7, 2013, WESTON documented the areas of observed contamination at the NFB site [Ref. 7, pp. 7– 12]. Three pieces of equipment were used to delineate the site: Ludlum Model 2221 Ratemeter and Model 44-10 Gamma Scintillator (2"x2" NaI probe), Ludlum Model 19 gamma µR/meter, and GE-Router Stokes PIC Model-RSS-131, which measure in units of cpm, microR/hr, and mrem/hr, respectively [Ref. 8, p. 4]. The areas of observed contamination are defined by site-attributable gamma radiation exposure rates, as measured by a survey instrument held one meter above the ground surface, which equal or exceed two times the site-specific background gamma radiation exposure rate [Ref. 38, p. 1]. At the NFB site, an area of approximately 168,832 ft^2 was found to have gamma radiation levels that exceed two times the background measurement of 8,391 cpm [Ref. 38, p. 1].

PIC data were collected at several boundary points to confirm the boundary [Ref. 7, pp. 7– 12, 20–21]. The PIC device measures true gamma radiation exposure rate, with an energy correction factor (a.k.a. energy response factor) of less than 2 percent, whereas the scintillation detector can have a much higher energy correction factor depending on the average gamma energy to which it is exposed [Ref. 38, pp. 1–3]. Therefore, PIC measurements are generally thought to be the more accurate method to measure the gamma radiation exposure rate [Ref. 38, pp. 1– 3]. Scintillation detectors are more commonly available than the PIC as field instruments because they are significantly less expensive, lighter, and quicker [Ref. 38, pp. 1– 3]. PIC measurements require a minimum of five minutes at each measurement location, whereas the scintillation detector requires one minute [Ref. 38, pp. 1–3].

A total of 41 locations, including two background location s, were surveyed for gamma radiation exposure rate using the PIC device, and concurrently for gamma count rate using the scintillation detector [Ref. 2, Figures 7 and 8; 4, pp. 7– 12, 20–21; 38, pp. 1– 2]. The purpose of collecting both types of measurements at each location was to evaluate the data for a linear relationship [Ref. 38, p. 3].

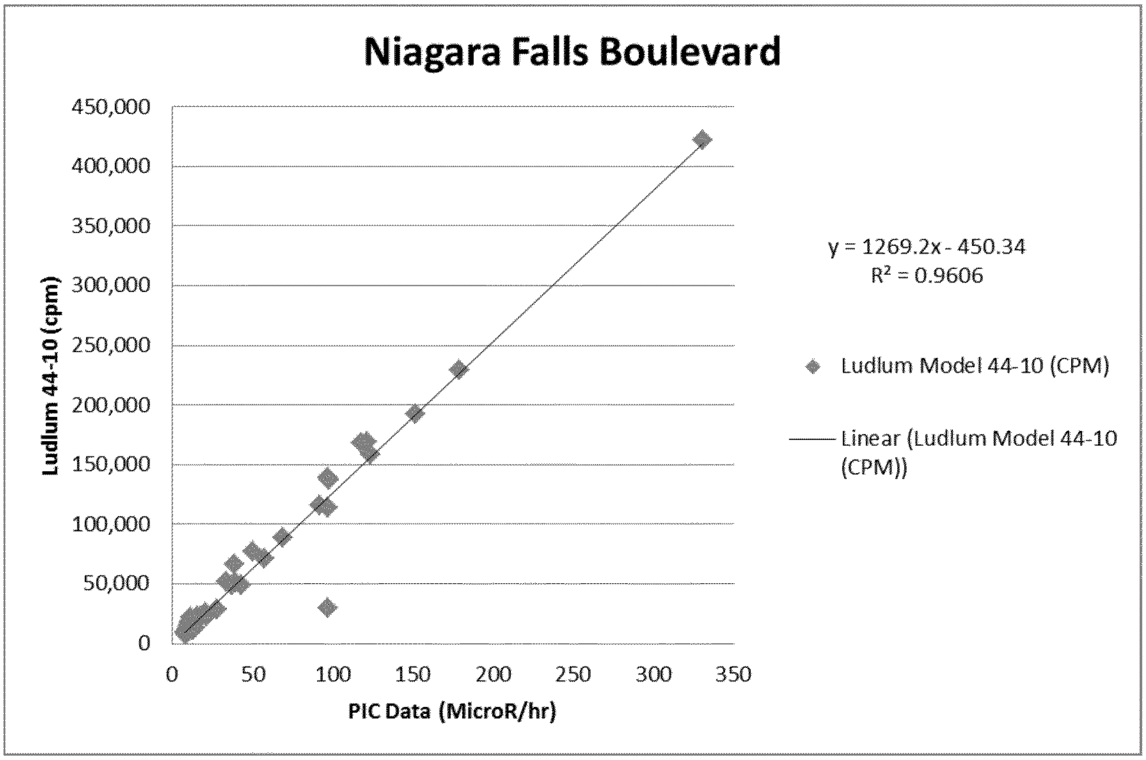
The PIC was placed at each of the 41 measurement locations for a minimum of 5 minutes to allow the response of the instrument to stabilize [Ref. 2, Figure 8; 7 , pp. 7-1 2; 38, p. 2]. Data were collected at sample locations and boundary locations for a total of 5 minutes (10 minutes for background sample locations) at six-second intervals and stored in the instrument's internal memory for subsequent downloading to a laptop [Ref. 2, Figure 8; 7, pp. 7–12; 38, pp. 1–2]. The downloaded six-second measurement data were subsequently reviewed by a WESTON Senior Safety Officer [Ref. 38, pp. 1– 3]. Based on the interpretation of the data, an average of the gamma radiation exposure rate at each location was calculated from the 5 -minute interval PIC data [Ref. 38, pp. 1–3]. The scintillation detector was operated in the scalar mode, collecting data for one minute (10 minutes for background locations) [Ref. 7, pp. 8, 10–11; 38, pp. 1–3].

The scintillation detector data in cpm and the PIC gamma radiation exposure rates in µR/hr for all measurement locations are presented below in Table 1 [Ref. 2, Figure 7 and 8; 7, pp. 8, 10–11]. The scintillation detector data are shown in Figure 7 and the gamma radiation exposure rate data are shown in Figure 8.

The primary objective of the survey was to delineate the source area by mapping the boundary line where the gamma radiation exposure rate at the NFB site equals two times the site-specific background gamma radiation exposure rate [Ref. 38, p. 1]. To evaluate this boundary, two locations were initially screened and measured as possible background locations [Ref. 7, pp. 6–7]. The site-specific background gamma radiation exposure rate was thus determined to be 8.118 µR/hr (8,391 cpm) [Ref. 2, Figures 7 and 8; 38, p. 1]. Therefore, two times the site-specific background gamma radiation exposure rate is 16.236 µR/hr (16, 782 cpm) [Ref. 2, Figures 7 and 8].

Based on screening with the scintillation detector, gamma radiation exposure rate measurement locations were preferentially selected as being slightly below or slightly above two times background in order to evaluate the extent of the source area [Ref. 2, Figure 8; 38, p. 2]. Based on these measurements, the boundary of the source area defined by readings that equal or exceed 16.236 µR/hr was determined [Ref. 38, pp. 1-3]. This delineated extent of the source area has an approximate correlation to the area of contamination delineated by soil sample analytical results [Ref. 38, p. 3].

Based on the collected data, the linear relationship of gamma radiation exposure rate (µR/hr) = (*x* cpm + 450.34)/1,269.2, as shown in the graph below [Ref. 38, pp. 2-3].



Soil/Slag Sampling

On December 11, 2013, WESTON personnel collected a total of sixteen soil samples (including one environmental duplicate sample) and three slag samples were collected from fifteen boreholes advanced through the NFB site and First Assembly Church located directly adjacent to the east northeast of the site property, using hollow-stem auger drilling methods [Ref. 7, pp. 13-16; 8, pp. 3, 6–8, 13–15].

At each borehole location, a temporary PVC casing was set at the borehole location [Ref. 7, p. 13; 8, p. 3]. A gamma scintillation meter (Ludlum Model 2221 Ratemeter and Model 44-62 Gamma Scintillator with 0.5"x1" NaI probe) was descended into a temporary PVC casing in order to determine the highest gamma radiation reading [Ref. 7, p. 13; 8, p. 3]. The objective was to use the highest gamma radiation readings along with visual documentation of the presence of slag to estimate the volume of slag at the site [Ref. 8, p. 3]. The PVC casing was used to prevent damage to the equipment as well as obtaining the most accurate data [Ref. 8, p. 3]. A one-minute count was recorded at every 6-inch interval down to 4 feet [Ref. 7, p. 14; 8, p. 3]. WESTON observed the slag to generally range in thickness from 0.5– 2 feet [Ref. 37, pp. 1–15]. The soil samples were collected directly below the slag [Ref. 7, p. 13; 37, pp. 1– 15]. Soil samples were collected using dedicated sampling equipment [Ref. 8, p. 3]. Potential source samples were collected from the NFB property; background samples were collected from the First Assembly Church property located east-northeast of the source area [Ref. 8, p. 3]. Background sample locations were determined based on low gamma screening findings; no slag was observed at background locations [Ref. 7, pp. 6–7; 8, p. 3; 37, pp. 14–15].

The slag samples each consisted of a singular rock collected in a dedicated plastic bag [Ref. 7, p. 15; 8, p. 6]. Each slag sample was screened using a Ludlum Model 2221 Ratemeter and Model 44-10 Gamma Scintillator (2" x 2" NaI probe) for a one-minute count [Ref. 7, p. 16; 8, p. 6]. The following one-minute count readings were documented: 88,461 cpm for SG-01, 71,520 cpm for SG-02, 112,380 cpm for SG-03 [Ref. 7, p. 16; 8, p. 6]. All remaining soil and slag not used for laboratory analysis was discarded at the sampling location [Ref. 8, p. 3].

The soil samples were analyzed by TestAmerica Laboratories for Target Analyte List (TAL) metals analysis; isotopic thorium (IsoTh), isotopic uranium (IsoU), radium-226, and radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy. The slag samples were also sent to TestAmerica Laboratories for IsoTh, IsoU, radium-226, and radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy analysis only [Ref. 8, pp. 2, 13–15].

WESTON logged soil and slag sample locations and areas of observed contamination locations electronically using GPS equipment and performed post-processing differential correction of the GPS data in accordance with EPA Region 2 GPS Standard Operating Procedures [Ref. 8, p. 4]. The processed GPS data for all samples have been transferred to the Sample Location Map (Figure 4) using Geographic Information Systems. [Ref. 2, Figure 4; 8, p. 4].

The soil data was first grouped into the radioisotopes included in the Th-232 decay series (Th-232, Th-228, Ra-228) and the U-238 decay series (U-238, U-234, Th-230 and Ra-226) [Ref. 32, p. 1]. The HRS states that in order to establish observed contamination for a site-attributable radionuclide: 1) value equal or exceeds a value of 2 standard deviations above the mean site-specific background concentration for that radionuclide and 2) values that exceeds the upper-limit value of the range of regional background concentration [Ref. 1, pp. 8– 9]. Employing the aforementioned criteria, as well as using professional judgment, significant values were established for the site.

To compare values which equal or exceed a value of 2 standard deviations above the site-specific background concentration, two soil samples were collected which exhibit and represent background soil conditions (2223-S14, -S15) [Ref. 8, p. 7; 32, pp. 1, 4; 33, pp. 33– 34]. For each individual radionuclide, the standard deviation was found for the two background sample values. The standard deviation was then multiplied by two and added to the mean site-specific value for the specific radionuclide [Ref. 32, p. 5]. This value was then compared to each analytical result.

To compare which values exceed the upper-limit value of the range of regional background concentrations, a range of approximately 0.5 pCi/g to 1.5 pCi/g was used to evaluate individual analytical results within each radionuclide [Ref. 32, p. 2]. In typical soil in the eastern U.S. the concentration of the individual radioisotopes of the Th-232 and U-238 decay series range from approximately 0.5 to 1.5 pCi/g. [Ref. 32, p. 2]. These concentrations are considered to be general background values for these isotopes [Ref. 32, p. 2].

Significant detections of radionuclides are noted below:

- Of the eleven soil samples collected in the area of observed contamination, eight are considered to contain significant concentrations of radionuclides:

    - Eight sample locations exhibited elevated concentrations of the thorium-232 (Th-232) decay series: 2223 -S02, -S04, -S05, -S06, -S07, -S08, -S09 and -S12. The highest analytical result reported for the Th-232 decay series was for sample 2223-S08, with a result of 5.10 +/- 0.803 pCi/g for Ra-228 [Ref. 32, pp. 2, 5; 33, pp. 18– 19, 21– 27, 31-34]. Analytical results for samples S02 and S12 are elevated but cannot be definitely attributed to site activities due to the measured concentrations are very near background concentrations ; therefore, the results may not be significant [Ref. 32, p. 2].

    - Analytical results reported for the U-238 decay series for samples 2223-S05, -S06, -S07, -S08 and -S09 were elevated with the maximum concentration detected (MDC) being 2.81 +/- 0.517 pCi/g for Ra-226 at 2223-S08 [Ref. 32, pp. 2, 5; 33, pp. 22– 27, 33–34]. Analytical results for samples -S02, -S04, -S05, -S06, and -S07 are possibly elevated but cannot be definitely attributed to site activities due to the measured concentrations are very near background concentration; therefore, the results may not be significant [Ref. 32, p. 2].

    - Analytical results reported for U-235/236 were either at below the MDC or at such low concentrations that it cannot be accurately quantified. Since there is no prior knowledge that either depleted or enriched uranium were present at this site, it is assumed that U-236/236 concentrations would be present at normal concentrations relative to the U-238 concentration [Ref. 32, p. 2].

All of the slag samples exhibited elevated activity [Ref. 32, pp. 2– 4; 33, pp. 37– 39]. However, the ratios of the individual isotopes within each decay series were not consistent, indicating that the slag material is not uniform on the site, and perhaps not from the same source [Ref. 32, pp. 2–3]. Samples 2223- SG-01 and 2223- SG-03 were similar, yet sample 2223- SG-02 was significantly different with a much higher concentration of Th-232 [Ref. 32, p. 3]. In sample 2223-SG-02, the Th-230 appears to be in equilibrium with the U-238, yet in samples 2223- SG-01 and 2223-SG-03, the Th-230 has been extracted from this decay series [Ref. 32, p. 3]. In all three samples, the radium results were elevated, particularly for Ra-228 [Ref. 32, p. 2]. The maximum concentrations in slag samples were detected in 2223-SG-02 as follows:

- U-238 at 196 pCi/g;
- Th-230 at 150 pCi/g;
- U-233/234 at 179 pCi/g;
- Ra-226 at 199 pCi/g;
- Th-232 at 541 pCi/g;
- Ra-228 at 807 pCi/g; and
- Th-228 at 554 pCi/g.

All three slag samples exhibit elevated activity of U-235/236, with the highest concentration found in 2223- SG-02 at 10.7 pCi/g [Ref. 32, pp. 3– 4; 33, pp. 37– 39]. Table 1 presents all analytical results for soil and slag samples.

Air Monitoring

On April 28, 2014, WESTON personnel collected air monitoring data with RAD7 radon detectors [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. During the April 2014 air monitoring event, background radon concentrations were measured as 0.00 +/- 0.16 pCi/L (to account for maximum background concentrations, the uncertainty value is added to the background measurement for an adjusted concentration of 0.16 pCi/L) during the morning hours and 0.00 +/- 0.16 pCi/L (adjusted concentration is 0.16 pCi/L) during the afternoon hours [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. Background thoron concentrations were measured as 0.039 +/- 0.08 pCi/L (adjusted concentrations is 0.12 pCi/L) during the morning hours and 0.00 +/- 0.04 pCi/L (adjusted concentration is 0.04 pCi/L) during the afternoon hours [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. To account for minimum possible release concentrations, the uncertainty value for each potential release measurement collected above and downwind of source areas is subtracted from the measurement to calculate the adjusted concentration [Ref. 44, pp. 4-5, 9, 11], There were no radon or thoron concentrations that exceeded background radon or thoron concentration values; therefore, a release of hazardous substances from the NFB site to air is not observed [Ref. 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11]. Table 2 presents the air monitoring results.

Table 1. Niagara Falls Boulevard Complete Analytical Results for Soil and Slag Samples

Location ID	S01				S02				S03				S04				S05				S06				S07			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	0.645	+/- 0.178	V	pCi/g	0.878	+/- 0.205	V	pCi/g	0.593	+/- 0.169	V	pCi/g	0.638	+/- 0.178	V	pCi/g	1.11	+/- 0.252	V	pCi/g	1.14	+/- 0.241	V	pCi/g	1.37	+/- 0.271	V	pCi/g
Thorium-230	0.685	+/- 0.187	V	pCi/g	1.12	+/- 0.250	V	pCi/g	1.28	+/- 0.27	V	pCi/g	0.956	+/- 0.21	V	pCi/g	0.887	+/- 0.215	V	pCi/g	1.55	+/- 0.312	V	pCi/g	2.19	+/- 0.47	V	pCi/g
Uranium-233/234	0.621	+/- 0.175	V	pCi/g	1.05	+/- 0.228	V	pCi/g	0.697	+/- 0.186	V	pCi/g	0.597	+/- 0.172	V	pCi/g	1.05	+/- 0.244	V	pCi/g	1.20	+/- 0.246	V	pCi/g	1.41	+/- 0.275	V	pCi/g
Radium-226	0.759	+/- 0.238	V	pCi/g	1.09	+/- 0.249	V	pCi/g	0.986	+/- 0.23	V	pCi/g	0.927	+/- 0.27	V	pCi/g	1.79	+/- 0.335	V	pCi/g	1.14	+/- 0.276	V	pCi/g	1.17	+/- 0.276	V	pCi/g
Location ID	S01				S02				S03				S04				S05				S06				S07			
Thorium-232	0.806	+/- 0.203	V	pCi/g	1.64	+/- 0.310	V	pCi/g	1.07	+/- 0.245	V	pCi/g	0.956	+/- 0.21	V	pCi/g	1.28	+/- 0.264	V	pCi/g	1.95	+/- 0.357	V	pCi/g	4.17	+/- 0.689	V	pCi/g
Radium-228	1.11	+/- 0.272	V	pCi/g	1.70	+/- 0.317	V	pCi/g	1.29	+/- 0.296	V	pCi/g	1.61	+/- 0.378	V	pCi/g	3.05	+/- 0.502	V	pCi/g	1.86	+/- 0.361	V	pCi/g	1.48	+/- 0.282	V	pCi/g
Thorium-228	0.751	+/- 0.196	V	pCi/g	1.53	+/- 0.300	V	pCi/g	1.05	+/- 0.24	V	pCi/g	0.936	+/- 0.208	V	pCi/g	1.51	+/- 0.292	V	pCi/g	2.08	+/- 0.374	V	pCi/g	3.92	+/- 0.665	V	pCi/g
Location ID	S01				S02				S03				S04				S05				S06				S07			
Uranium-235/236	0.0202	0.0488	UV	pCi/g	0.153	0.091	V	pCi/g	0.0626	0.0611	UV	pCi/g	0.0524	0.0554	UV	pCi/g	0.0453		V	pCi/g	0.101	0.0737	V	pCi/g	0.0623	0.0609	U	pCi/g
	Ref. 33, pp. 17, 18				Ref. 33, pp. 18, 19				Ref. 33, p. 20				Ref. 33, p. 21				Ref. 33, p. 22				Ref. 33, pp. 23-24				Ref. 33, pp. 24-25			

Location ID	S08				S16 Duplicate				S09				S10				S11				S12				S13			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	1.71	+/- 0.314	V	pCi/g	0.962	+/- 0.237	V	pCi/g	1.75	+/- 0.309	V	pCi/g	0.999	+/- 0.233	V	pCi/g	1.11	+/- 0.242	V	pCi/g	1.15	+/- 0.267	V	pCi/g	0.697	+/- 0.194	V	pCi/g
Thorium-230	2.34	+/- 0.401	V	pCi/g	1.39	+/- 0.260	V	pCi/g	2.09	+/- 0.365	V	pCi/g	0.883	+/- 0.229	V	pCi/g	1.01	+/- 0.232	V	pCi/g	1.08	+/- 0.243	V	pCi/g	0.719	+/- 0.184	V	pCi/g
Uranium-233/234	1.76	+/- 0.319	V	pCi/g	1.10	+/- 0.255	V	pCi/g	1.55	+/- 0.287	V	pCi/g	0.798	+/- 0.205	V	pCi/g	1.14	+/- 0.247	V	pCi/g	1.13	+/- 0.266	V	pCi/g	1.10	+/- 0.25	V	pCi/g
Radium-226	2.81	+/- 0.517	V	pCi/g	0.944	+/- 0.258	V	pCi/g	0.940	+/- 0.309	V	pCi/g	0.938	+/- 0.217	V	pCi/g	0.980	+/- 0.237	V	pCi/g	1.16	+/- 0.246	V	pCi/g	1.09	+/- 0.253	V	pCi/g
Location ID	S08				S16				S09				S10				S11				S12				S13			
Thorium-232	3.14	+/- 0.482	V	pCi/g	1.23	+/- 0.241	V	pCi/g	4.03	+/- 0.556	V	pCi/g	0.686	+/- 0.199	V	pCi/g	0.836	+/- 0.207	V	pCi/g	1.61	+/- 0.303	V	pCi/g	0.731	+/- 0.184	V	pCi/g
Radium-228	5.10	+/- 0.803	V	pCi/g	1.46	+/- 0.315	V	pCi/g	1.58	+/- 0.381	V	pCi/g	1.31	+/- 0.306	V	pCi/g	1.11	+/- 0.26	V	pCi/g	1.99	+/- 0.39	V	pCi/g	1.32	+/- 0.297	V	pCi/g
Thorium-228	4.04	+/- 0.571	V	pCi/g	1.36	+/- 0.257	V	pCi/g	3.84	+/- 0.541	V	pCi/g	0.722	+/- 0.212	V	pCi/g	1.01	+/- 0.233	V	pCi/g	1.60	+/- 0.303	V	pCi/g	0.705	+/- 0.18	V	pCi/g
Location ID	S08				S16				S09				S10				S11				S12				S13			
Uranium-235/236	-0.00527	+/- 0.00745	UV	pCi/g	0.0256	+/- 0.045	UV	pCi/g	0.0522	+/- 0.0523	V	pCi/g	0.0181	+/- 0.0425	UV	pCi/g	0.0174	+/- 0.0408	UV	pCi/g	0.0104	+/- 0.0344	UV	pCi/g	0.0577	+/- 0.061	U	pCi/g
	Ref. 33, p. 26				Ref. 33, pp. 35-36				Ref. 33, pp. 26-27				Ref. 33, p. 28				Ref. 33, pp. 29-30				Ref. 33, pp. 30-31				Ref. 33, p. 32			

Location ID	S14 Background				S15 Background				SG01				SG02				SG03			
	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit	Result	Total Uncertainty	Qualifier	Unit
Uranium-238	1.35	+/- 0.29	V	pCi/g	0.911	+/- 0.215	V	pCi/g	153	+/- 13.4	V	pCi/g	196	+/- 17.1	V	pCi/g	147	+/- 12.9	V	pCi/g
Thorium-230	0.869	+/- 0.215	V	pCi/g	0.799	+/- 0.191	V	pCi/g	1.05	+/- 0.176	V	pCi/g	150	+/- 21.4	V	pCi/g	3.62	+/- 0.434	V	pCi/g
Uranium-233/234	1.18	+/- 0.27	V	pCi/g	0.816	+/- 0.204	V	pCi/g	144	+/- 12.7	V	pCi/g	179	+/- 15.7	V	pCi/g	143	+/- 12.5	V	pCi/g
Radium-226	1.14	+/- 0.269	V	pCi/g	1.12	+/- 0.250	V	pCi/g	164	+/- 17.3	V	pCi/g	199	+/- 20.9	V	pCi/g	196	+/- 20.6	V	pCi/g
Location ID	S14				S15				SG01				SG02				SG03			
Thorium-232	0.885	+/- 0.214	V	pCi/g	0.964	+/- 0.212	V	pCi/g	3.49	+/- 0.402	V	pCi/g	541	+/- 56	V	pCi/g	9.91	+/- 0.997	V	pCi/g
Radium-228	1.06	+/- 0.294	V	pCi/g	1.42	+/- 0.183	V	pCi/g	590	+/- 60.4	V	pCi/g	807	+/- 82.4	V	pCi/g	758	+/- 77.5	V	pCi/g
Thorium-228	0.971	+/- 0.231	V	pCi/g	0.712	+/- 0.349	V	pCi/g	3.35	+/- 0.391	V	pCi/g	554	+/- 57.2	V	pCi/g	10.4	+/- 1.02	V	pCi/g
Location ID	S14				S15				SG01				SG02				SG03			
Uranium-235/236	0.0325	+/- 0.046	UV	pCi/g	0.0636	+/- 0.062	UV	pCi/g	8.17	+/- 1.21	V	pCi/g	10.7	+/- 1.5	V	pCi/g	8.10	+/- 1.19	V	pCi/g
	Ref. 33, p. 33				Ref. 33, p. 34				Ref. 33, pp. 37-38				Ref. 33, p. 38				Ref. 33, p. 39			

V = Verified by Certified Health Physicist
U = Indicates the analyte was analyzed for but not detected
pCi/g = picocurie per gram

Niagara Falls Boulevard

Table 2 - Average Radon and Thoron Concentrations

Location ID	AM or PM	Meter S/N	Date/Time (end)	Air Temp. [C]	RH [%]	Battery Voltage	Calculated Radon [pCi/L]	Uncertainty [pCi/L]	Adjusted Radon [pCi/L]
Background 1	AM	2970	4/28/2014 12:12	23.1	4.50%	6.17	0.00	0.16	0.16
Background 2	PM	2970	4/28/2014 17:43	21.4	3.75%	6.17	0.00	0.16	0.16
Source 1	AM	2941	4/28/2014 12:12	25.8	5.75%	6.24	0.020	0.040	-0.020
Source 2	PM	2968	4/28/2014 17:43	26.2	3%	6.16	0.00	0.16	-0.16
Source 3	PM	2941	4/28/2014 17:43	24.8	3.25%	6.24	0.059	0.070	-0.011
Downwind 1	AM	2857	4/28/2014 12:12	20.4	3%	6.14	0.00	0.16	-0.16
Downwind 1 (DUP)	AM	2968	4/28/2014 12:12	22.8	3.25%	6.16	0.039	0.055	-0.016
Downwind 2	PM	2857	4/28/2014 17:43	19.3	2.75%	6.14	0.040	0.057	-0.017

Location ID	AM or PM	Meter S/N	Date/Time (end)	Air Temp. [C]	RH [%]	Battery Voltage	Calculated Thoron [pCi/L]	Uncertainty [pCi/L]	Adjusted Thoron [pCi/L]
Background 1	AM	2970	4/28/2014 12:12	23.1	4.50%	6.17	0.039	0.080	0.12
Background 2	PM	2970	4/28/2014 17:43	21.4	3.75%	6.17	0.00	0.040	0.040
Source 1	AM	2941	4/28/2014 12:12	25.8	5.75%	6.24	0.16	0.16	0.00
Source 2	PM	2968	4/28/2014 17:43	26.2	3%	6.16	0.078	0.11	-0.032
Source 3	PM	2941	4/28/2014 17:43	24.8	3.25%	6.24	0.039	0.080	-0.041
Downwind 1	AM	2857	4/28/2014 12:12	20.4	3%	6.14	0.041	0.080	-0.039
Downwind 1 (DUP)	AM	2968	4/28/2014 12:12	22.8	3.25%	6.16	0.077	0.11	-0.033
Downwind 2	PM	2857	4/28/2014 17:43	19.3	2.75%	6.14	0.12	0.14	-0.020

PART IV: HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.**

   A release to groundwater is not suspected; groundwater samples were not collected as part of the SI sampling investigation.

2. **Describe the aquifer of concern; include information such as depth, thickness, geologic composition, areas of karst terrain, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.**

   The site is underlain by glacial sediments consisting primarily of till and lacustrine silt and clay, which have a thickness of approximately 10 feet. These deposits act as a confining unit that limits flow of water to and from the more permeable weathered bedrock below the sediments. However, there is no known use of groundwater for drinking water supplies within 4 miles of the site.

   The glacial sediments are underlain by about 170 feet of virtually undeformed dolomites and limestone of the Lockport Group of the Niagaran Series. The hydraulic properties of the Lockport Group are related primarily to secondary permeability caused by fractures and vugs. The principal water-bearing zones in the Lockport Group are the weathered bedrock surface and horizontal-fracture zones. This weathered rock ranges from 10– 25 feet in thickness. The fractures in this zone show signs of weathering and have been widened by chemical dissolution.

   The Lockport Group is in turn underlain by the Clinton Group, which consists of about 100 feet of shale and limestone. A natural-gas reservoir in the underlying Clinton Group prevents downward flow of water from the Lockport Group.

   The Medina Group, which consists of about 110 feet of sandstone and shale, underlies the Clinton Group. The Richmond Group underlies the Medina Group and consists of brick-red sandy to argillaceous shale with an average thickness of 1,200 feet.

   The Niagara River is the ultimate point of discharge for most groundwater in the Niagara Falls area. Recharge from overlying glacial sediments enters the weathered bedrock. Recharge also enters the Lockport Group through infiltration from the Niagara River in areas where the bedrock crops out in the river bottom as well as recharge from the infiltration from the New York Power Authority (NYPA) reservoir. General groundwater flow direction is west.

Geologic Unit	Depth (Approximate)	Thickness (Approximate)
Glacial sediments	0 feet	Maximum 10 feet
Weathered bedrock	>10 feet	10–25 feet
Lockport Group	>20 feet	170 feet
Clinton Group	>190 feet	100 feet
Medina Group	>290 feet	110 feet
Richmond Group	>400 feet	1,200 feet
Bedrock	>1600 feet	N/A

Ref. 9, p. 1; 20, pp. 6–13.

3. What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?

Analytical data of on-site soil samples collected from sample locations 2223-S02, -S04, -S05, -S06, -S08, -S07, -S08, -S09 and –S12 (greatest depth: 2.5–4 feet bgs) indicated significant detections of radionuclides. There are no aquifers utilized for public water supply use within 4 miles of the site; therefore, there is no underlying aquifer of concern.

Ref. 2, Figure 4; 24, p. 1; 32, pp. 1–5; 33, pp. 17–34.

4. What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the top of the aquifer of concern?

Vertical hydraulic conductivity of the glacial sediments, weathered bedrock, and unweathered bedrock were estimated to be 6.6×10^{-3} ft/d, 1.3×10^{-2} ft/d, and 1.1×10^{-3} ft/d, respectively. The transmissivity of the weathered bedrock was estimated to be 220 ft^2/d. The transmissivity of each horizontal-fracture zone within the Lockport Group was estimated to be approximately 99 ft^2/d. Therefore, the maximum transmissivity of the entire Lockport Group was calculated to be 1,100 ft^2/d; sum of the transmissivity of the weathered bedrock and each of the nine identified regional facture zones. However, no drinking water wells have been identified in the aquifer within a 4-mile radius of the site.

Ref. 10, pp. 134–135; 20, pp. 25–26.

5. What is the net precipitation at the site (inches)?

The average annual precipitation for Niagara Falls is 34.92 inches.

Ref. 21, p. 1.

6. What is the distance to and depth of the nearest well that is currently used for drinking purposes?

There are no known public or domestic groundwater wells utilized for drinking water within a 4-mile radius of the site. The population within a 4-mile radius of the site receives its drinking water supply from the Niagara Falls Water Board and the Niagara Falls Water District, whose source of water is the upper Niagara River.

Ref. 10, pp. 134–135; 22, pp. 1–2; 23, pp. 1–2; 24, pp. 1–6; 29, pp. 12.

7. If a release to groundwater is observed or suspected, determine the number of people that obtain drinking water from wells that are documented or suspected to be actually contaminated by hazardous substance(s) attributed to an observed release from the site.

A release to groundwater of site-attributable contaminants is neither observed nor suspected; see Question No. 1 for a description of the likelihood of release.

8. Identify the population served by wells located within 4 miles of the site that draw from the aquifer of concern.

Distance	**Population**
0 - ¼ mile	None identified.
>¼ - ½ mile	None identified.
>½ - 1 mile	None identified.
>1 - 2 miles	None identified.
>2 - 3 miles	None identified.
>3 - 4 miles	None identified.

Ref. 10, pp. 134–135.

State whether groundwater is blended with surface water, groundwater, or both before distribution.

There are not known to be any public or domestic groundwater wells utilized for drinking water within a 4-mile radius of the site. The population within a 4-mile radius of the site receives its drinking water supply from the Niagara Falls Water Board and the Niagara Falls Water District, whose source of water is the west branch of the upper Niagara River.

Ref. 10, pp. 134–135; 22, pp. 1–2; 23, pp. 1–2; 24, pp. 1–6; 29, pp. 1–2.

Is a designated wellhead protection area within 4 miles of the site?

There are no known public or domestic groundwater wells utilized for drinking water within a 4-mile radius of the site; therefore, there are no designated wellhead protection areas.

Ref. 10, pp. 134–135; 22, pp. 1–2; 23, pp. 1–2; 24, pp. 1–6; 29, pp. 1–2.

Does a waste source overlie a designated or proposed wellhead protection area? If a release to groundwater is observed or suspected, does a designated or proposed wellhead protection area lie within the contaminant boundary of the release?

There are no known public or domestic groundwater wells utilized for drinking water within a 4-mile radius of the site; therefore, there are no wellhead protection areas. Additionally, a release to groundwater is not suspected.

Ref. 10, pp. 134–135; 22, pp. 1–2; 23, pp. 1–2; 24, pp. 1–6; 29, pp. 1–2.

9. Identify one of the following resource uses of groundwater within 4 miles of the site (i.e., commercial livestock watering, ingredient in commercial food preparation, supply for commercial aquaculture, supply for major, or designated water recreation area, excluding drinking water use, irrigation (5-acre minimum) of commercial food or commercial forage crops, unusable).

There are no known resource uses of groundwater within 4 miles of the site.

Ref. 10, pp. 134 –135.

SURFACE WATER ROUTE

10. Describe the likelihood of a release of contaminant(s) to surface water as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.

A release to surface water is possible, although not suspected. The majority of the source area delineated for this Site is located beneath an asphalt cover; however, the area does extend into the wooded area behind the bowling alley and parking lot. It is likely that the majority of the overland flow at the Site would enter storm drains located throughout the parking lots or along Niagara Falls Boulevard. The storm sewers flow along Niagara Boulevard for approximately 0.5 mile (2,640 feet) before discharging into Cayuga Creek.

Ref. 2, Figures 2 and 6; 7, p. 18; 25, pp. 1–3.

11. Identify the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.

The majority of the overland flow at the Site would enter storm drains located throughout the parking lots or along Niagara Falls Boulevard. The storm sewers flow along Niagara Boulevard for approximately 0.5-mile (2,640 feet) before discharging into Cayuga Creek.

Ref. 2, Figures 1 and 2; 7, p. 18; 25, pp. 1–3.

12. What is the distance in feet to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.

The majority of the overland flow at the Site would enter storm drains located throughout the parking lots. The storm sewers flow along Niagara Boulevard for approximately 0.5 mile (2,640 feet) before discharging into Cayuga Creek.

Ref. 2, Figures 1 and 2; 7, p. 18; 25, pp. 1–3.

13. Identify all surface water body types within 15 downstream miles.

Name	Water Body Type	Flow (cfs)	Salt/Fresh/Brackish
Cayuga Creek	Small to moderate stream	27.5	Fresh
*Little River	Moderate to large stream	>100 -1,000	Fresh
*Niagara River	Very large river	>100,000	Fresh

*The Niagara River (a.k.a. Upper Niagara River) flow rate is controlled and varies from 50,000 cfs to over 100,000 cfs. Locally, the Niagara River is referred to as the Upper and Lower Niagara River; the Upper Niagara River constitutes the portion of the Niagara River upstream of Niagara Falls; the Lower Niagara River is the portion of the Niagara River downstream of the Niagara Falls. There are no USGS stream flow gauges on Little River; therefore, it is assigned a water body type greater than that of Cayuga Creek, which flows into Little River.

Ref. 1, p. 7; 2, Figure 6; 26, pp. 4–5.

14. Determine the 2-yr, 24-hr rainfall (inches) for the site.

The 2-year, 24-hour rainfall for the Site is 2.5 inches.

Ref. 43, p. 5.

15. Determine size of the drainage area (acres) for sources at the site.

The Site is relatively flat. The drainage area for the site is limited to the source area of the site; the source area of the site is 3.6 8 acres. The majority of the overland flow at the Site would enter storm drains located throughout the parking lots or along Niagara Falls Boulevard. The storm sewers flow along Niagara Boulevard for approximately 0.5 mile (2,640 feet) before discharging into Cayuga Creek.

Ref. 2, Figures 2 and 4; 7, pp. 18–21, 25, pp. 1–3; 38, p. 1.

16. Describe the predominant soil group in the drainage area.

Surface soil beneath the site is classified as silt loam and silty clay loam. These soils have very low infiltration rates and are very poorly drained and poorly drained, respectively, with maximum hydraulic conductivity rates of 4 µm/sec.

Ref. 10 , pp. 129–130.

17. Determine the type of floodplain that the site is located within.

Portions of the Site are located within the 100-year floodplain and 500-year floodplain, as well as outside of the 500-year floodplain.

Ref. 28, pp. 1-3.

18. Identify drinking water intakes in surface waters within 15 miles downstream of the point of surface water entry. For each intake identify: the name of the surface water body in which the intake is located, the distance in miles from the point of surface water entry, population served, and stream flow at the intake location.

There are two surface water intakes located within the 15-mile downstream target distanc e limit; both intakes are located very near each other on the Niagara River, on Buckhorn Island State Park, approximately 3.5 miles downstream of the PPE. The intakes are shown by a single location marker on the 15-Mile Surface Water Pathway Map for the site. The Niagara Falls Water Board (NFWB) obtains water for potable use from one intake and the Niagara County Water District (NCWD) obtains water for potable use from the other intake. Each intake is the sole source of potable water. The NFWB supplies drinking water to approximately 51,000 people within the City of Niagara Falls and surrounding area. The NCWD provides drinking water to approximately 150,000 persons within Niagara, Erie, and Orleans Counties.

Ref. 2, Figure 6; 23, pp. 1–2; 24, pp. 1–6; 29, p. 2.

19. Identify fisheries that exist within 15 miles downstream of the point of surface water entry. For each fishery specify the following information:

The NYSDOH has issued a fish consumption advisory for Cayuga Creek. The advisory recommends not eating any fish from the Cayuga Creek. The NYDOH also issued a fish advisory for the upper Niagara River, limiting the number of carp eaten to one meal per month, and an advisory for the lower Niagara River recommending not eating any fish of certain species and limiting the number eaten of other species to one meal per month. The advisories are based the presence of PCBs and dioxins in the surface water body. PCBs and dioxins are not contaminants attributable to the Site.

Fishery Name	Water Body Type	Flow (cfs)	Salt/Fresh/Brackish
Niagara River	Very large river	>100,000	Fresh

Ref. 2, Figure 6; 26, pp. 4–5; 30, pp. 8–9.

20. Identify surface water sensitive environments that exist within 15 miles of the point of surface water entry.

Environment	Water Body Type	Flow (cfs)	Distance from Site
HRS-eligible wetlands	Very large river	>100,000 cfs	~ 1.5 miles
State designated natural area	Very large river	>100,000 cfs	~ 7.3 miles

Ref. 2, Figure 6; 27, pp. 1– 2.

21. If a release to surface water is observed or suspected, identify any intakes, fisheries, and sensitive environments from question Nos. 18-20 that are or may be actually contaminated by hazardous substance(s) attributed to an observed release of from the site.

A release to surface water is neither observed nor suspected; see Question No. 10 for a description of the likelihood of a release.

22. Identify whether the surface water is used for any of the following purposes, such as: irrigation (5-acre minimum) of commercial food or commercial forage crops, watering of commercial livestock, commercial food preparation, recreation, potential drinking water supply.

The Niagara River (both Upper and Lower) is used for recreation (e.g., kayaking).

Ref. 39 , pp. 1–3.

SOIL EXPOSURE PATHWAY

23. Determine the number of people that occupy residences or attend school or day care on or within 200 feet of observed contamination.

There are no residences, schools, or daycare centers on or within 200 feet of observed contamination.

Ref. 2, Figure 2.

24. Determine the number of people that regularly work on or within 200 feet of observed contamination.

There are 4– 5 workers on site daily at the bowling alley located on the 9524 parcel. The buildings located on the 9540 parcel are currently unoccupied.

Ref. 34, p. 1.

25. Identify terrestrial sensitive environments on or within 200 feet of observed contamination.

There are no terrestrial sensitive environments on or within 200 feet of observed contamination.

Ref. 2, Figure 4; 40, pp. 1-7.

26. Identify whether there are any of the following resource uses, such as commercial agriculture, silviculture, livestock production or grazing within an area of observed or suspected soil contamination.

There are no known resource uses of soil within the area of observed contamination. The area of observed contamination encompasses a building, an asphalt parking lot, and a wooded area.

Ref. 2, Figure 2 and 4; 7, pp. 18–24.

AIR PATHWAY

27. Describe the likelihood of release of hazardous substances to air as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them the site. For observed release, define the supporting analytical evidence and relationship to background.

A release of hazardous substances from the NFB site to air is not observed. WESTON personnel collected air monitoring data with RAD7 radon detectors on April 28, 2014. During the April 2014 air monitoring event, background radon concentrations were calculated to be 0.00 +/- 0. 16 pCi/L (adjusted concentration is 0.16 pCi/L) during the morning hours and 0 .00 +/- 0. 16 pCi/L (adjusted concentration is 0.16 pCi/L) during the afternoon hours. Background thoron concentrations were calculated to be 0.039 +/- 0.08 pCi/L (adjusted concentrations is 0.1 2 pCi/L) during the morning hours and 0 .00 +/- 0.04 pCi/L (adjusted concentration is 0.04 pCi/L) during the afternoon hours. There were no radon or thoron concentrations that exceeded background radon or thoron concentration values; therefore, a release of hazardous substances from the NFB site to air is not observed.

Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11.

28. Determine populations that reside within 4 miles of the site.

Distance	Population
>0 - ¼ mi	1,214
>¼ - ½ mi	2,348
>½ - 1 mi	3,953
>1 - 2 mi	13,905
>2 - 3 mi	11,286
>3 - 4 mi	19,009

Ref. 31, p. 1.

29. Identify sensitive environments, including wetlands and associated wetlands acreage, within 4 miles of the site.

Distance	Wetlands Acreage	Sensitive Environments
On-site	0	None identified.
0–0.25 mi.	18.51	None identified.
0.25 –0.50 mi.	39.22	None identified.
0.50-1 mi.	231.94	None identified.
1-2 mi.	668.71	None identified.
2-3 mi.	1,148.12	1 State-listed threatened habitat.
3-4 mi.	2,755.92	11 State-listed threatened or

endangered species habitats and 1
unique biotic community.

Ref. 2, Figure 5; 27, p. 1; 40, pp. 1–7.

30. If a release to air is observed or suspected, determine the number of people that reside or are suspected to reside within the area of air contamination from the release.

A release of hazardous substances from the NFB site to air is not observed. See Question 27 for a more detailed description.

Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11.

31. If a release to air is observed or suspected, identify any sensitive environments, listed in question No. 29, that are or may be located within the area of air contamination from the release.

A release of hazardous substances from the NFB site to air is not observed. See Question 27 for a more detailed description.

Ref. 2, Figure 9; 7, pp. 17-20, 31-32; 44, pp. 2-5, 9, 11.

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